APPENDIX A

Judgment.

NOT TO BE PUBLISHED—SEE LOCAL RULE 8 (r)

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 81-2006
September Term, 1981

Jeannine Honicker,
Petitioner,
v.
United States of America, *et al.*
Respondents.

PETITION FOR REVIEW OF AN ORDER OF THE NUCLEAR REGULATORY COMMISSION

Before: ROBINSON, Chief Judge, and TAMM, Circuit Judge and EARL. R. LARSON, Senior District Judge for the District of Minnesota*

JUDGMENT

This cause came on for consideration on the petition for review of an order of the Nuclear Regulatory Commission and briefs were filed by the parties. While the issues presented occasion no need for an opinion, they have been accorded full consideration by the Court. See Local Rule 13(c). On consideration of the foregoing, it is

ORDERED AND ADJUDGED, by this Court, that the order of the Nuclear Regulatory Commission under review herein is hereby affirmed.

Per Curiam
For the Court
George A. Fisher, Clerk

Filed May 11, 1982

*Sitting by designation pursuant to 28 U.S.C. 294(d).

APPENDIX B

Order.

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 81-2006
September Term, 1981

Jeannine Honicker,
Petitioner,
v.
United States of America, *et al.*
Respondents.

Before: ROBINSON, Chief Judge, and TAMM, Circuit Judge and EARL. R. LARSON, Senior District Judge for the District of Minnesota*

O R D E R

On consideration of petitioner's petition for rehearing, filed May 21, 1982, it is

ORDERED by the Court, that the aforesaid petition is denied.

Per Curiam
For the Court
George A. Fisher, Clerk

Filed June 7, 1982

*Sitting by designation pursuant to 28 U.S.C. 294(d).

APPENDIX C

Order.

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 81-2006
September Term, 1981

Jeannine Honicker,
Petitioner,
v.
United States of America, *et al.*
Respondents.

Before: ROBINSON, Chief Judge, and TAMM, Circuit Judge and EARL. R. LARSON, Senior District Judge for the District of Minnesota*

ORDER

Petitioner's suggestion for rehearing *en banc* has been circulated to the full Court and no member of the Court or the panel has requested the taking of a vote thereon. On consideration of the foregoing, it is

ORDERED by the Court, that the aforesaid suggestion is denied.

Per Curiam
For the Court
George A. Fisher, Clerk

Filed June 7, 1982

*Sitting by designation pursuant to 28 U.S.C. 294(d).

APPENDIX D

Order and Opinion.

Federal Register / Vol. 46, No. 149 / 39573

Tuesday, August 4, 1981 / Rules and Regulations

NUCLEAR REGULATORY COMMISSION

10 CFR Part 2

Denial of Petition for Revoking Nuclear Plant Licenses

AGENCY: Nuclear Regulatory Commission.

ACTION: Denial of a Petition requesting the NRC to revoke the licenses of all nuclear plants and all other fuel cycle facilities except those involving isolation of hazardous radioactive material.

SUMMARY: The Commission has determined that the petition filed by Ms. Jeannine Honicker requesting a permanent shutdown of all licensed nuclear plants and associated fuel cyle activities, except waste disposal facilities, should be denied. The Commission has found that the Honicker petition greatly overestimates the health effects caused by radioactive effluents from the nuclear fuel cycle. The Commission has also rejected the petition's legal argument that nuclear power must be held unlawful if it can be shown that its health impacts will include deaths among the general public.

EFFECTIVE DATE: August 4, 1981.

FOR FURTHER INFORMATION CONTACT: E. Leo Slaggie, Attorney, Office of the General Counsel, U.S. Nuclear Regulatory Commission, Washington, DC 20555, 202-634-3224.

SUPPLEMENTARY INFORMATION:

1. Background

Ms. Jeannine Honicker of Nashville, Tennessee, filed before the Nuclear Regulatory Commission (NRC) a petition dated July 29, 1978 asking the Commission to revoke the licenses of all nuclear plants and virtually all other nuclear fuel cycle activities except those dealing with disposal of wastes.[1] The petition asserted that the nuclear fuel cycle is "inextricably intertwined with the release of deadly poisons to the biosphere." The petition claimed that "hundreds to thousands of additional cancers" are now occurring as a result of routine releases of radioactive fuel cycle effluents and that "on the order of 100 deaths will occur at the milling stage of the nuclear fuel cycle to future people for each day that fuel is produced." Petition at 128. The petition called for substantial action "to address the emergency" within thirty days.

In a letter to Ms. Honicker dated September 7, 1978 the Commission said that because the petition raised complex technical issues the Commission would await an analysis from its technical staff

[1] The "nuclear fuel cycle" associated with the enriched uranium-fueled power reactors used by the U.S. nuclear industry includes uranium mining and milling, production of uranium hexafluoride, isotopic enrichment, fuel fabrication, spent fuel storage and disposal, possible reprocessing of irradiated fuel, transportation of radioactive materials and management of low- and high-level wastes. Radioactive effluents and other impacts associated with waste management and reprocessing were recently discussed by the Commission in the statement of consideration supporting a final rule specifying fuel cycle impact values to be included in environmental reports and impact statements for individual light-water nuclear power reactors. *See* 46 *Fed. Reg.* 45282 (August 3, 1978).

before deciding whether the merits of the petition should be addressed in the first instance by the staff, pursuant to 10 CFR 2.206,[1] or by the Commission itself. The Commission concluded that no emergency action was warranted pending receipt of staff comments, "in view of [the Commission's] intent to address the matter expeditiously, and the lack of a clear demonstration of a need for emergency action."

On October 26, 1978 the staff submitted to the Commission a written analysis of the petition, SECY–78–560. The staff's response reviewed present knowledge about radiation health effects as applied to the health impacts of the nuclear fuel cycle and concluded that the Honicker petition should be denied. Rather than directing the staff to issue a denial, however, the Commission concluded that the Honicker petition constituted primarily a challenge to the adequacy of NRC's regulations and licensing standards and should, therefore, be answered directly by the Commission itself, pursuant to 10 CFR 2.802 and the Commission's general supervisory powers. The Commission informed Ms. Honicker of this conclusion in a letter dated December 7, 1978 and also reaffirmed its earlier finding that no clear need had been demonstrated for emergency relief pending full consideration and disposition of the petition. With regard to the denial of emergency relief, the letter stated:

> The Commission notes that your claim that a large number of deaths will result from each day's operation of the nuclear fuel cycle rests primarily on the assertion that radon releases associated with uranium mill tailings will cause deaths among generations far in the future. The NRC has been considering what significance should be attached to these radon releases. The Commission has previously determined that an immediate shutdown of nuclear plants is not required while the radon releases associated with uranium mill tailings are under consideration.
> • • •
> Second, with regard to radiation health effects from fuel cycle emissions other than radon, the cumulative risks over the relatively short period before a decision on your petition can be reached should be small. The licenses which you ask the Commission to revoke were issued after careful consideration of the health and environmental impacts as well as the need for the activity being licensed. The significance and interpretation of much of the data on which you rely are presently the subject of considerable controversy within the scientific community. Thus, the Commission has determined that these licenses should not be summarily revoked pending full review of the issues you raise.

The December 7, 1978 letter offered Ms. Honicker an opportunity to comment on the technical staff's analysis of the petition and invited her participation in an ongoing proceeding to analyze the health effects of low-level radiation as related to current occupational exposure standards. Ms. Honicker filed on January 5, 1979 a 63-page commentary on the NRC staff's analysis. The Commission asked for the technical staff's views on this commentary and also directed several specific questions to the staff on issues relevant to the petition. The staff submitted its reply on March 19, 1979. SECY–79–180.

The Three Mile Island accident on March 28, 1979 delayed the Commission's response to the Honicker petition. However, there were a number of exchanges of communications between persons representing Ms. Honicker and the NRC technical staff concerning the subject of the petition. These exchanges amounted in part to a running commentary on developments in

[1] Section 2.206 of Title 10, Code of Federal Regulations, provides that any person may request the Director of Nuclear Reactor Regulation, the Director of Nuclear Material Safety and Safeguards, or the Director of the Office of Inspection and Enforcement, as appropriate, to initiate proceedings to revoke licenses. The Director's response to a 2.206 request may be reviewed by the Commission on its own motion.

the field of radiological health effects. In a letter dated August 6, 1979 Ms. Honicker submitted a list of 38 citations to documents released subsequent to her January 5, 1979 commentary and asked that this material be considered as part of the Commission's review. A staff memorandum dated September 13, 1979 to the Commission's Office of the General Counsel provided detailed comments on many of those documents and concluded that they did not add any significant support to the petition's arguments for a nuclear shutdown.

The staff comments and the other documents and letters referred to above are included in the administrative record underlying the Commission's present action on the Honicker petition. Additional material related to nuclear fuel cycle health effects has been recently prepared by the NRC technical staff in response to a Commission directive that an explanatory narrative be prepared for use in conjunction with the recently promulgated final fuel cycle rule ("Table S-3"). See 44 FR 45362 (August 2, 1979). The draft narrative proposed by the staff in response to this directive has been issued as a proposed amendment to the fuel cycle rule and is included in the administrative record as a source of health effects estimates relevant to the Commission's disposition of the Honicker petition. 46 FR 15154 (March 4, 1981). Other documents in the administrative record are available for public inspection in the Commission's Public Document Room at 1717 H Street, NW., Washington, DC 20555.

Based on the material in the administrative record and on its legal analysis of the arguments presented in the Honicker petition, the Commission has concluded that the petition should be denied. The explanation for this decision is set out below.

2. Description of the Petition

The Honicker Petition bases its request for a total nuclear shutdown on the argument that radioactive effluents released in normal operation of nuclear plants and supporting fuel cycle activities are causing and will continue to cause unacceptable health effects.[3] The petition takes the position that if one or more fatal cancers will result from continuing the nuclear power program then the program should be terminated at once. To determine the health effects of radioactive effluents the petition relies on what it calls the "medical principle" that there is no known threshold or safe level of ionizing radiation below which such radiation can be said with reasonable certainty to pose no risk to human health. This "no threshold" hypothesis underlies the petition's estimates of various nuclear fuel cycle health effects due to very low level radiation doses and, as the petition points out, is used by the NRC itself in estimating fuel cycle environmental impacts. The petition stresses that NRC health effects estimates based on the no-threshold hypothesis show fatal cancers resulting from normal fuel cycle radioactive releases.[4] The petition views

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[3] Previous requests that the Commission order a wide-scale shutdown of nuclear power activities have stressed the risk of accidents rather than the effects of normal operations. *See, e.g., Nader* v. *Ray*, 363 F. Supp. 946 (D.D.C. 1973). Although the Honicker petition refers to the possibility of accidental releases as a significant source of radiation health effects, the petition rests its case for a shutdown primarily on what it believes will be the health effects caused by radioactive releases in normal operations.

[4] For example, the petition refers to health effects estimates in the NRC's Generic Environmental Statement on the Use of Recycle Plutonium in Mixed Oxide Fuel in Light Water Cooled Reactors ("GESMO"), NUREG-0002 (1976). *See* Petition, page 134. Calculations in NUREG-0002 follow the hypothesis that the health effects due to low-level radiation are linearly proportional to dose. The risk factors used to convert radiation doses to estimated health effects were taken from the 1972 report of the U.S. National Academy of Sciences Advisory Committee on the Biological Effects of Ionizing Radiation, "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation." (This is the so-called "BEIR" report, or "BEIR-I." A more recent BEIR report, BEIR-III, was released in 1980 and is discussed in Section 4 of this denial). These risk factors for low doses and dose rates were obtained

(Continued)

these estimates as an admission by the NRC that lives are intentionally being sacrificed to generate electricity by nuclear power. The petition concludes that the nuclear power program therefore violates moral, statutory, constitutional and international law and should be halted at once. The petition argues that even if nuclear power were providing great economic benefits, which the petition contends it does not, such benefits could not make lawful or justified the loss of a single life. The petition states that "because human life and health are paramount considerations, the Commission may not balance the economic consequences of shutdown against any visible threat to human health."[5] Petition at page 129.

The petition's own nuclear power health effects estimates are much larger than NRC estimates.[6] The petition

by extrapolation from response data at high doses and dose rates.

Nuclear fuel cycle health effects estimates obtained on this basis are given in Table IV, J-14 of NUREG-0002, captioned "Estimated Health Effects U.S. [Nuclear] Industry, 1975-2000" which gives for total U.S. occupational, U.S. nonoccupational, and foreign cancer deaths as of the year 2000 the estimates 350, 150, and 28, respectively for a projected nuclear power generation capacity of 507,000 MWe by the year 2000. Recent capacity projections are considerably lower. The Energy Information Administration's 1979 Annual Report to Congress forecast a nuclear generation capacity between 160,000 and 200,000 MWe by the year 2000. DOE/EIA-0173(79), Vol. 3, Table 5.12. On the other hand, the GESMO health effects figures, while assuming a larger industry than now appears likely, may have underestimated the contribution of long-term dose commitments to nuclear power health effects. More recent NRC estimates appear in the Commission's explanatory narrative proposed to accompany the final fuel cycle rule. 46 FR 15154 (March 4, 1981). Assuming a total of 190 nuclear power reactors—the number now operating, being built, or tentatively planned in the United States—the proposed narrative estimates, on the basis of a 100-year environmental dose commitment, an excess cancer mortality of 494 among the U.S. population, exclusive of health impacts from uranium mining and milling radon effluents. 46 FR 15167. For radon effluents the NRC technical staff has estimated that for the entire nuclear industry projected in 1985 radon releases "have a calculated potential to cause 61 premature deaths from cancer in the total U.S. population by the end of the 21st century." *See* "Radon Releases from Uranium Mining and Milling and their Calculated Health Effects," NUREG-0757, page iii, February 1981.

These estimates represent the results of model calculations which describe the range of health effects deemed possible but should not be taken as hard and fast predictions that these estimated fatalities will in fact occur. With current knowledge the health effects of low-level radiation cannot be predicted with confidence. It is possible that (1) no health effects at all will be caused or (2) the health effects actually caused will be greater than those estimated.

[5] The petition claims that shutting down the nuclear industry to avoid loss of life would not in any case involve much economic sacrifice, because the electric utility industry has "vast unused generating capacity and current inexpensive methods of energy generation that do not have associated health effects of this magnitude." Petition, page 125. The petition cites energy conservation and solar power as alternatives to nuclear power and fossil fuel combustion in meeting new electrical energy needs. Ms. Honicker's "Comments of the Petitioner's Staff on the NRC Staff Response to Her Petition for Emergency and Remedial Action" filed January 5, 1979 provides additional argument aimed at showing that replacement power and conservation options are available so that an immediate ban on nuclear power would have only small immediate economic repercussions, apart from damage to the nuclear industry itself. Concerning this damage these "Comments" note: "The 130,000 workers in nuclear fuel cycle facilities may lose their present employment. The petition has not requested their imprisonment for criminal conspiracy." Comments at page 15. In support of the position that a nuclear shutdown would in the long run be beneficial, the Comments quote extensively from literature dealing with "soft" energy technology (*e.g.*, conservation, solar heating, wind machines, organic converters) versus "hard" technology (large-scale generating facilities). In the Comments as in the petition itself, however, the question whether nuclear power is or is not economically beneficial appears to be only a side issue. The Comments stress: "There can be *no* economic benefits at the cost of human lives and liberties." Comments at page 11 (emphasis in the original).

[6] In its "Summary of the Physical Evidence," page 128, the petition asserts, among other things, that "*on the order of 100 deaths* will occur at the milling stage of the nuclear fuel cycle *to future peoples for each day that fuel is produced*" [emphasis in original], that "*[h]undreds to thousands of additional cancers* are occurring among citizens now living in the vicinity of fuel cycle facilities due to the designed routine releases and common accidental releases of radiotoxins" [emphasis in the original], and that "[t]he range of revised estimates for cancer and leukemia from routine fuel cycle releases is now from 100 to 1,000,000 annually."

further states that in view of potential improvements in data and analysis its own estimates "may be orders of magnitude too low" but that in any event "the best available current evidence now indicates that release to the biosphere of these poisons [*i.e.*, radioactive effluents] at any level attainable by present design of the fuel cycle constitutes a serious public health burden and a loss of life to millions of people over long periods of time." Petition at page 127. In view of these health effects of nuclear power, the petition asserts that the NRC cannot assure that the nuclear facilities it regulates can be operated "without endangering the health of the public," and that the Commission is, therefore, obliged under the Atomic Energy Act to shut those facilities down.

Going beyond the Atomic Energy Act as a basis for finding nuclear power unlawful, the petition cites the Fifth Amendment to the United States Constitution, specifically the language:

> No person shall be . . . deprived of life . . . without due process of law . . .

as a prohibition against government action which imposes "upon a private citizen the risk of death, or a health burden which the individual citizen does not consent to bear." Petition at 142.

The petition frames the constitutional issues as follows:

> May a government agency which Congress has invested with regulatory power over the imposition of poisons to the general population, set as a reasonable standard a limit which allows any number of innocent citizens to die, involuntarily, without due process, without express constitutional delegation of this power from the people, without question? Certainly not.

Petition at 143. Because practical regulatory standards for the nuclear fuel cycle must permit the release of at least a small amount of radioactive material, the petition concludes that no course other than complete shutdown of the industry can be reconciled with the Constitution.

Invoking international law as well, the petition characterizes present operation of the nuclear industry as an "intentional elevation of the death rate to an entire population" and therefore tantamount to "humanicide," a "crime of state" condemned by national and international commitments to human rights.[1] Petition at 136 ff. The petition further describes the nuclear power program as a "national medical experiment" involving injury and death to unconsenting subjects and, therefore, unacceptable under principles set out by the 1946 Nuremberg International Military Tribunal.

3. Analysis of the Petition

As support for its shutdown request the Honicker petition has raised an extensive spectrum of objections to nuclear power, including risk of serious accidents, assertedly large health impacts from normal operations, and lack of need for more electricity in general and for nuclear generation in particular. The petition touches on the impacts of virtualy every stage of the nuclear fuel cycle, reproducing at length from the technical literature detailed material that is often highly controversial. Relatively little of this information is new. The NRC has considered much of it at one time or another in the past, either in challenges to licenses for particular nuclear facilities or in connection with petitions

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[1] International declarations and covenants cited by the petition include the United Nations Universal Declaration of Human Rights (1948), the International Covenant on Civil and Political Rights (1966), the International Covenant on Civil and Political Rights (1966), and the American Declaration of the Rights and Duties of Man (Adopted by the Ninth International Conference of the American States, 1948). These documents typically include language guaranteeing every human being "the inherent right to life."

for rulemaking to amend certain aspects of the Commission's regulations.[8] What is different about the Honicker petition is its attempt to use this evidence in a much more general fashion as a basis for arguing that the entire nuclear industry should be completely and permanently shut down. Accordingly, this response focuses on the question whether the petition has identified technical or legal problems which require no lesser remedy than immediate, complete, and final shutdown of the nuclear industry.[9]

The petition's case for a shutdown can be divided into two distinct lines of argument. First, there is the claim that the Commission has greatly underestimated the health effects cost of nuclear power and overestimated the economic benefits. This quantitative line of argument is basically a factual challenge to findings the Commission has made in licensing and rulemaking decisions that nuclear power health effects will lie within a range deemed acceptable and that the benefits of operating licensed facilities will outweigh their adverse impacts on health and the environment.

Second, the petition argues that regardless of the quantitative details of the cost-benefit balance, a nuclear shutdown is required because, as a matter of law, even a single health effect is too much; cost-benefit analysis is irrelevant when the costs are in lives. To invoke this legal argument the petition relies on a fact not in dispute: The models and risk factors generally used to estimate the health effects caused by nuclear fuel cycle radioactive effluents all show some fatal cancers. The petition concludes that this fact alone suffices to prove that the NRC violates the health and safety requirements of the Atomic Energy Act by licensing nuclear plants and, more fundamentally, denies inalienable rights secured by the Constitution and international law.

4. Response to the Petition's Quantitative Cost-Benefit Argument

a. *Health Effects Estimates.*

The Commission believes that the best available evidence contradicts the petition's quantitative estimates of nuclear power health effects and continues to support the NRC's much lower estimates. The petition's health impact predictions are high for a variety of reasons. Sometimes the petition misreads the scientific data it cites to show that radiation health effects have been underestimated.[10] The petition also places great reliance on certain radiation health effects studies which have been strongly questioned by the

[8] For example, in responding to a 1979 petition by the New England Council on Nuclear Pollution the Commission addressed much the same arguments and evidence on health effects associated with radon releases from uranium mill tailings which the Honicker Petition invokes in arriving at the major portion of the fatalities which the Petition sees as a consequence of nuclear power. *See* 45 FR 13513 (April 14, 1979). The same issues are presently being addressed in licensing proceedings for a number of individual nuclear plants. *See* the *Matter of Philadelphia Electric Co.* (Peach Bottom Atomic Power Station, Units 2 and 3), etc., ALAB-562, 10 NRC 437 (1979). In a recent rulemaking the Commission set out regulations and standards for the disposal of mill tailings aimed at keeping radon releases within acceptable limits. 48 FR 45521 (October 5, 1980).

[9] We proceed on the assumption that the Commission would have the authority to grant the requested relief, though it is not clear that the Commission could in fact order the permanent shutdown of the entire nuclear industry, as distinct from shutting down specific facilities pending correction of safety or environmental problems. The Supreme Court has indicated that resolution of such "fundamental policy questions" as the "choice to at least try nuclear energy" has been made by the Congress. *See Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519 (1978) at 557, 558.

[10] The NRC staff, in responding to the petitioner's claim that the biological effects of some forms of low-level radiation are much higher than federal regulatory authorities have assumed, has pointed out that the petition mistakenly relied on irrelevant data taken at high exposures and applied an erroneous graphical analysis which, if correct, would in fact show that at sufficiently low exposures no health effects would occur. *See* SECY-79-569, p. 38 ff.

scientific community. For example, the petition cites as an "important data base" the results obtained by Mancuso, Stewart and Kneale in a study of workers exposed to radiation at Hanford. Health Physics, 33:369–385 (1977). This study has been criticized recently in the 1980 report of the National Academy of Sciences Committee on the Biological Effects of Ionizing Radiation ("BEIR" Committee), "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation," National Academy of Sciences, 1980 ("BEIR–III"). Finding the Hanford results unpersuasive evidence for rejecting previous radiation risk estimates, the BEIR Committee noted the low statistical power of the Hanford data and the availability of alternative explanations for the observed dose associations. The Committee stated that at present "there seems little reason to abandon the body of epidemiologic evidence on radiation-induced cancer that, although based on greater exposures, yields consistent and statistically stable estimates." BEIR–III, page 556 (*page* references are to the typescript edition of BEIR–III).

Other radiation health effects studies relied on by the Honicker petition were also found seriously flawed by the BEIR–III report. These include work by Najarian on cancer deaths among workers at the Portsmouth Naval Shipyard in New Hampshire, Lancet 1:1018–1020 (1978), an analysis by Archer on possible correlations between variations in natural background radiation and cancer rates, Health Physics 34:237–247 (1978); analysis of the tri-state leukemia survey by Broes and Natarajan, J. Amer. Med. Assoc. 237:2393–2401, 1977; testimony by Broes before the U.S. Senate Committee on Commerce, Oversight Committee for Radiation Safety and Health, June 17, 1977); and studies by E. J. Sternglass (report on "Changes in Infant Mortality Patterns Following the Arrival of Fallout from the September 26, 1976 Chinese Nuclear Weapon Test" presented to the BEIR Committee July 18, 1977). See comments in BEIR–III, pages 553–568. The BEIR–III report found that none of these investigations justified a conclusion that previously accepted estimates of radiological risk were much too low, although the Committee stated that low-dose radiation effects on cell membranes, a radiation damage mechanism emphasized by Dr. Sternglass, merited further study. BEIR–III, pp. 561–566.

Overall, the 1980 BEIR–III Report discussion of radiological risk does not bear out the petition's speculations that radiation risk factors set out in the 1972 BEIR report and used by the NRC [11] would turn out to be much too low. Although a simple comparison of risk factors cannot readily be made because the 1980 report has adopted a more complicated model for estimating cancer risks than the linear dose response model used in the 1972 report, the BEIR–III Committee has made no major qualitative change from its 1972 assessment of radiological risk. For low LET (linear energy transfer) radiation, the Committee found that the 1972 linear hypothesis risk assessments might well be too high.[12] For high LET radiation, the Committee saw a possibility that the linear hypothesis might underestimate risk at low doses but, consistent with its appraisal of the studies cited in the Honicker petition, apparently saw no indication that the potential underestimate was sufficiently serious to require revision of previous risk

[11] See note 4 above.

[12] The National Council on Radiation Protection and Measurements (NCRP) has also concluded that use of the linear hypothesis to estimate human health effects of low-LET radiation at low doses and low-dose rates based on data at high doses and dose rates, may overestimate those effects by a factor of between 2 and 10. See Chapter 12 of NCRP Report No. 64, "Influence of Dose and Its Distribution in Time on Dose-Response Relationships for Low-LET Radiation."

estimates. The BEIR–III Committee summarized its position as follows:

It is by no means clear whether dose rates of gamma or x radiation of about 100 mrads/yr are in any way detrimental to exposed people; any somatic effects would be masked by environmental or other factors that produce the same types of health effects as does ionizing radiation. It is unlikely that carcinogenic effects of low-LET radiation administered at this dose rate will be demonstrated in the foreseeable future. Notwithstanding these limitations, the Committee recognizes the need to estimate the effects on human population exposed to radiation at very low doses. In most cases, the linear hypothesis, as the 1972 BEIR report indicated, probably overestimates, rather than underestimates, the risk from low-LET radiation. For high-LET radiation, such as from internally deposited alpha-emitting radionuclides, the application of the linear hypothesis is less likely to lead to overestimates of risk and may, in fact, lead to underestimates.

BEIR–III, page 187.[13]

With regard to genetic effects, the BEIR–III report notes:

Although the Committee used a new method of estimating genetic effects expressed in the first generation, the present estimates of genetic effects are not notably different from those of the 1972 BEIR report.

BEIR–III, page 7. In sum, the findings of the BEIR–III report do not support the proposition that NRC health effects estimates based on 1972 BEIR risk factors need substantial revision.[14]

Another reason for the petition's attribution of excessive health consequences to nuclear power is that the petition takes inadequate account of measures short of shutting down the entire fuel cycle which can be taken to reduce radioactive releases, if the need is demonstrated, to keep potential health effects well below the high levels the petition predicts. The petition also assumes overly pessimistic scenarios in assessing the effects of fuel cycle releases on future generations. The petition repeatedly argues that fuel cycle activities involve a "death commitment" of 80 to 100 deaths per day (*see, e.g.*, Petition at 126, 127). This point does not refer to near-term fatalities but rather to cancers which the petitioner believes will occur over future generations over tens of thousands of years.[15]

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[12] Regulations of the Environmental Protection Agency covering most nuclear fuel cycle operations, 40 CFR Part 190, are intended to assure that these operations will be conducted so that resulting population exposures to members of the public will be kept well below 100 mrads per year. *See* 40 CFR 190.10. Fuel-cycle-originated releases of radon, which are excepted from the EPA rules, are covered by standards established by the NRC. These releases are associated with the mining and milling of uranium and disposal of tailings. Resultant health effects primarily involve high-LET radiation. Generally, the NRC standards for milling operations and tailings disposal assure that resulting radon exposures will be no more than a small percentage of background exposure to radon already naturally present. *See* Final Generic Environmental Impact Statement on Uranium Milling, NUREG–0706, September 1980, pages 12–13—12–15 and table 12.2. II. Risks associated with such radon exposures were described in note 4, below, and are also discussed later on in this response. See text associated with notes 15, 16, and 17.

[13] The Commission is aware of recently publicized studies of the Hiroshima radiation exposure data which raise questions about whether BEIR–III may have underestimated the hazards of low-LET radiation. *See* "New A-Bomb Studies Alter Radiation Estimates," *Science*, Vol. 212, p. 900, May 22, 1981. In advance of further exposition and peer review it would be premature to draw precise quantitative conclusions about the changes, if any, which re-interpretation of the Hiroshima data might introduce into the radiological risk factors used by the NRC. Because the NRC has assumed that low-LET radiation is potentially harmful, even at low doses and dose rates, and has used the linear, no-threshold model for estimating health effects, the Commission does not see any need to change its qualitative perception of radiological risk at this time. The NRC technical staff has reported to the Commission that the suggested revisions, if borne out by farther study, would lead to quantitative changes in current risk estimates at most on the order of a factor of two. This magnitude of change would not affect the Commission's views on the merits of the Hunicker petition.

[14] Radon-222, an alpha particle emitter, has only a four-day half-life, but will be continuously generated in tailings piles by the decay of Radium-226, which has a half-life of about 1600 years, and which in turn is the daughter product of Thorium-230, a radionuclide which has a half-life of about 80,000 years.

As support for its view that radon from tailings piles presents a serious and unavoidable hazard, the petition cites a 1977 memorandum by Dr. Walter Jordan, a member of the Commission's Atomic Safety and Licensing Board Panel. In his memorandum Dr. Jordan pointed out that earlier NRC staff estimates of fuel cycle radon releases had erroneously ignored the continuing radon generation in tailings piles for many thousands of years. He noted that seepage of this radioactive gas could lead to large total doses to future generations. Using radon release figures which assume existence of a two-foot thick cover over the tailing to limit seepage,[16] Dr. Jordan estimated that deaths and genetic effects in future generations resulting from the annual fuel requirement for a single reactor "can run into the hundreds." Taking the rate to be 400 deaths per reactor annual fuel requirement and apparently assuming 70 operating reactors, the petition concluded that "the loss of life among future citizens from each year's commitment to the nuclear fuel cycle is 28,000 [or on the order of 80 lives per day of fuel cycle operation] from the mill tailings alone." Petition at 42.

If this petition were correct, it would make nuclear power almost as dangerous as the automobile and would call for prompt remedial action. However, it is unrealistic, because NRC is now taking measures to reduce radon releases from tailings piles. NRC regulations promulgated since the filing of the petition are intended to assure that mill tailings piles will be abandoned with no more than a minimal amount of covering and left without further attention. *See* Amendments to 10 CFR Parts 30, 40, 70 and 150, 45 FR 65521 (October 3, 1980).

The new regulations, promulgated to implement the Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604 (92 Stat. 3037), take account of "the inescapable fact that the tailings will * * * remain hazardous for extremely long periods of time." The regulations set radon emission limits aimed at assuring "that radon exhalation rates (from tailings disposal sites) will be within the range of flux rates occurring naturally from nearby soils." 45 FR 65525. To cope with the need to maintain these rates for extremely long periods these regulations incorporate design features to make disposal sites "similar to land forms which have been known to be stable for extremely long periods of time * * *. In general, the condition of tailings disposal sites should be virtually the same as those in surrounding environs and should remain so without active care and maintenance." In the Final Generic Environmental Impact Statement on Uranium Milling, NUREG-0706, September 1980, the NRC technical staff estimated that .040 potential annual premature cancer deaths might result from continuous long-term radon releases from mill tailings generated in North America until the year 2000, assuming the tailings are disposed of in accordance with the new requirements. See NUREG-0706, Section 12.3.4.4. For comparison, the staff estimated a continuing annual rate of six premature cancer deaths if no tailings control measures are implemented. NUREG-0706, page 5.

The control measures required by the NRC are thus expected to reduce the estimated potential health effects of radon releases by more than two orders of magnitude. It would appear

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[16] The petition states that Dr. Jordan's figures assumed "optimum management of the tailings." Petition, page 42. This is incorrect. As is discussed in the text below, methods of tailings pile stabilization far more effective than adding a two-foot earth cover are now available and cost-effective. Recent NRC regulations favor below-grade disposal and require earth cover of not less than three-meters, stabilized so as to reduce to negligible amounts the potential for significant wind and water erosion. *See* amendments to 10 CFR Parts 30, 40, 70 and 150, 45 *Fed Reg.* 65521 (October 3, 1980).

technically possible though very expensive to reduce these releases to zero, in effect improving upon natural conditions prior to the mining of uranium, by requiring some kind of extremely deep burial of the tailings. The control standards now in force reflect the Commission's view that the costs of achieving complete isolation of tailings would not be justified by the highly uncertain additional benefits.[17]

As this discussion of radon releases illustrates, the petition's claims that the nuclear fuel cycle creates excessive radiological risk, even if correct, do not state a case for the total shutdown the petitioner requests, so long as relief would be available through additional control measures, either industrywide or at particular facilities as appropriate. The radon health effect evidence cited by the petition demonstrates a need for improved regulation of mill tailings disposal. The Commission believes its recent rule amendments have fulfilled this need. Similarly, with regard to fuel cycle radioactive releases other than radon, the appropriate remedy for an unacceptably high release level would be additional control measures to limit the release.

The Commission has confidence that its regulatory program keeps radioactive releases within acceptable limits. Each facility which the Commission licenses is reviewed at the time of licensing to assure that radiation exposures due to facility operation not only will be less than maximum permissible limits set out in 10 CFR Part 20, but also will be kept "as low as reasonably achievable" ("ALARA"). *See* 10 CFR 20.1 and 10 CFR Part 50, Appendix I. By the ALARA standard the Commission does not mean "as low as possible" but rather "as low as reasonably achievable taking into account the state of technology, and the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to the utilization of atomic energy in the public interest." 10 CFR 20.1(b). The ALARA approach thus expresses the Commission's view that radiation exposures should be kept at or below a level justified by the benefit of the operation which produces them. The Commission recognizes, however, that at some point the cost of reducing the exposure still further may become so great in terms of financial outlays, foregone opportunities, or both that it is unreasonable to require a further reduction. Under the ALARA principle, the fact that a licensed facility releases radioactive effluents that can cause potential health effects would not in itself constitute an argument for shutting down the facility. Indeed, the facility would not have been licensed in the first place without a finding by the Commission that the radiological impact of the facility is justified by a countervailing benefit and could not be reduced still further without a cost that would exceed the benefit of the reduction. This is not to say that the Commission has necessarily struck the right balance in every licensing action or that nuclear fuel cycle radiation exposures are at an all-time irreducible minimum. If the Commission's previous decisions now need modification, however, means for correction and change are readily available.

In summation, the petition is correct in saying there are some potential health costs of nuclear power, but the petition has failed to show that these costs are likely to be significanty different from the estimates the Commission has used in finding that licensed nuclear facilities, though not risk-free, will operate with adequate protection for public health

[17] Petitions for review of the Commission's uranium milling license requirements are presently before the U.S. Court of Appeals for the Tenth Circuit in consolidated cases, *Kerr-McGee Corporation, et al.* v. *NRC*, Nos. 80-2043, 80-2229, 80-2269, and 80-2271. The petitioners have contended that the regulations are unnecessarily strict.

and safety. The appropriate response to reducing excessive radiation health effects, if these were demonstrated, would in any case focus on changes at particular facilities or amendments to particular regulations rather than termination of the industry. The petition's quantitative analysis greatly overestimates nuclear fuel cycle health effects and does not state a case for permanently shutting down the entire nuclear industry.

b. *Consequences of a Shutdown.* In addition to making a safety finding, before authorizing construction of a nuclear plant the Commission evaluates the evironmental impact of the proposed facility (which includes potential impact on human health), as required by the National Environmental Policy Act of 1969 (NEPA), and determines whether the need for the facility offsets the environmental costs. *See, e.g., Kansas Gas and Electric Co., et al.* (Wolf Creek Generating Station, Unit 1), ALAB-462, 7 NRC 320, 327 (1978). The petition claims, however, that the nuclear power program—approximately 10 percent of U.S. generating capacity—could be shut down immediately without loss of benefits to anyone except the industry itself.[18] As it sole justification for this claim the petition cites data indicating that the electrical power industry has a capacity 32 percent in excess of peak load demands.[19] The petitioner appears to believe that any set of generating facilities constituting a percentage smaller than the "excess capacity" can be dropped from the system without cost to the public, regardless of location of the plants, their newness or obsolescence, relative operating cost, or any other factors which might otherwise be thought to bear on the need for a particular power plant.

The Commission has a number of problems with this conclusion. A substantial amount of excess capacity beyond peak load demands, normally 15% to 25%, is needed as a normal reserve against foreseeable contingencies (i.e., scheduled and forced outages). Furthermore, the aggregate U.S. reserve margin does not by itself convey much information about the need for particular facilities, because this margin averages out levels of excess capacity and levels of insufficient capacity that may exist in specific systems or reliability councils. For example, during the summer of 1980, although reserves for the U.S. as a whole were adequate, specific systems faced load-shedding and other reliability problems.[20]

Nuclear plants generally function as base load units intended to operate on a more or less continuous basis. Even when there is unused capacity, the nuclear units are not the ones which stand idle. The immediate shutdown of these facilities would in most cases lead to their replacement by older, less reliable fossil-fueled power plants with higher economic costs and potential health impacts of their own. In certain areas of the country where there has been a major commitment to nuclear power, the shutdown of all nuclear plants could cause serious shortages and hardship.

The petition has not established that "excess capacity" has eliminated any significant benefit from nuclear power, nor does it deal with the likelihood that the power that would replace the nuclear units would be more expensive

[18] See note 5 above.

[19] More recent figures show that in July 1980 the peak load reserve margin, defined as the ratio of the difference between the system net capability and the peak load to the peak load itself, was approximately 30 percent. *Electric Power Monthly*, August 1980, U.S. Department of Energy, Energy Information Administration, DOE/EIA-0226 (80/08), Table 15, page 28. In 1980 nuclear power produced approximately 10.9% of all electricity generated in the United States. Nuclear power facilities now constitute slightly more than 10% of United States electrical generating capacity.

[20] In July 1980 the effective peak load reserve margin was reported to be 8%. *Electric Power Monthly*, August 1980, Table 14, page 28.

than the nuclear power and that some replacement power would contravene national policy by using foreign oil. The possibility remains open that conservation or a switch to new technologies may eventually reduce or even eliminate the need for some nuclear generating facilities, the feasibility and timing of any such replacement would depend strongly on individual situations. However, the petition does not make a case for shutting down the entire nuclear industry. For most plants, the Commission determined that the plants were needed at the time they were licensed. The fact that plants are being used to generate electricity demonstrates their present need.

5. Response to the Petition's Legal Argument

The Commission recognizes that the Honicker petition does not oppose the nuclear power program solely or even primarily because of quantitative arguments about which way the cost-benefit balance tips. The petition asserts that regardless of economic benefit the Commission cannot lawfully authorize activities which will cause cancer deaths among the general population. The petition has noted that the Commission's own estimates of nuclear power health impacts include a number of radiologically induced cancer deaths among present and future populations.[21] Changes in nuclear technology that might reduce these health impact estimates to zero are not now foreseeable. Thus, if the law in fact prohibited licensing of nuclear plants so long as their impacts include cancer fatalities, the petition's legal argument would state a case for a shutdown of the industry.

The petition sees such a prohibition in the Fifth Amendment to the Constitution:

> No person shall be * * * deprived of life, liberty, or property, without due process of law. * * *

The Commission would readily accept the proposition that this language forbids the federal government to authorize or carry out without due process of law an activity which has the purpose of taking lives of persons under the protection of the laws of the United States. The nuclear power program, however, is not such an activity. The purposeful taking of life has no part in the licensing of nuclear fuel cycle facilities. Any resulting harm is an entirely unwanted side effect to be minimized or eliminated where practicable, and risks are distributed more or less uniformly among the public at large rather than directed by State action at particular pre-selected individuals or groups. The petition has cited no legal authority to show that the reach of the Fifth Amendment extends to such government action.

The protection of life in the Fifth and Fourteenth Amendments has been applied by the courts to proscribe government action taken with the overt purpose of depriving particular individuals of life. *See, e.g., Screws* v. *United States*, 325 U.S. 91 (1945). The petition has cited no cases where the elements of purpose and particularity were missing.[22] Rather than presenting

[21] The Commission assumes for the purposes of this response that in accordance with these estimates a small number of fatalities will actually be caused by radioactive releases from licensed nuclear fuel cycle activities. As we have noted previously in note 4, however, present knowledge of radiological risk is not sufficient to allow firm predictions that radiologically induced human cancers will in fact result from population exposure to the low doses and dose rates caused by releases by nuclear fuel cycle activities in normal operations. Because the estimated effects are small and indistinguishable compared to the number of fatal cancers occurring for other reasons, there seems little likelihood that either the presence or absence of cancers caused by normal fuel cycle releases can be confirmed by direct measurement.

[22] The Supreme Court appears to have stressed that for the Fifth and Fourteenth Amendments to apply, the threat to life must be borne by particular, ascertainable individuals rather than the public at large. Recently, in *Martinez* v. *State of California*, 444 U.S. 277 (1980), the Court held that a victim murdered by a State mental hospital parolee had

support for its broad interpretation of the constitutional protection of life, the petition has focused instead on the meaning of "due process of law," citing a few authorities which equate due process in the context of deprivation of life with court proceedings and safeguards for persons accused. Petition, page 142. The requirements for due process involving "trials" of an "accused" do not apply to the regulation of nuclear power. The petition's due process analysis thus does not support its attempt to apply the constitutional protection of life outside the field of police and judicial action.

The Fifth Amendment does not proscribe all government activity which includes loss of life among its foreseeable effects. Such a constitutional prohibition would have a disruptive effect on society, since nuclear power is not the only government-authorized activity which foreseeably can lead to deaths among members of the public. In transportation, an example of an activity subject in many aspects to licensing or other government authorization, even without negligence some fatal accidents are certain to occur, on occasion causing deaths not only to persons who have voluntarily subjected themselves to the risk of travel but also to unfortunate bystanders. In any large-scale private or government activity involving the use or licensing of vehicles, accidental deaths can be expected. Health impacts also appear likely to result from industrial and vehicular emissions which government affirmatively authorizes or at least declines to prohibit, often solely in the interest of furthering economic activity.[23] It appears likely that many government actions affecting a complex society with a population over two hundred million could be connected by a plausible chain of causality to at least a small number of premature deaths. Presumably, under the petition's interpretation of the Fifth Amendment, all these activities would have to cease. Logically, however, the cessation, would be equally unconstitutional because the licensed activities—ambulances or power plants—also save lives.

Similarly, in the protection-of-life language of the various treaties and international covenants cited by the petition the Commission sees an effort to protect individuals against government action purposefully aimed at killing. The petition's broader reading encounters the same social and practical objections which make its interpretation of the Fifth Amendment unacceptable. Accordingly, the Commission finds that the petition has failed to show that either the Constitution or international law applies to the health impacts of nuclear power in any manner that requires a halt to the licensing of nuclear power plants.

Absent constitutional restraints, the power to determine the conditions under which the Commission can license nuclear plants lies with Congress. The Atomic Energy Act of 1954 authorizes the Commission to issue licenses for

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not been deprived of life without due process of law in the constitutional sense, even though the Court assumed the State knew or should have known that the parolee's release "created a clear and present danger that such an incident would occur." *Id.* at 280. The Court noted that "the parole board was not aware that [the victim], as distinguished from the public at large, faced any special danger." *Id.* at 285.

[23] Quantitative health effects estimates for generation of electricity by burning of coal also show premature deaths. Some studies have concluded these health effects will be substantially greater than those for the nuclear fuel cycle. *See, e.g.*, R. L. Gotchy, "Health Effects Attributable to Coal and Nuclear Fuel Cycle Alternatives," draft, NUREG–0332 (1977). *See, also*, "Energy in Transition, 1985–2010," Final Report of the Committee on Nuclear and Alternative Energy Systems ("CONAES"), National Research Council, National Academy of Sciences, Washington, D.C., published by W. H. Freeman and Company (1979).

nuclear power plants upon a finding that the facility "will provide adequate protection to the health and safety of the public." 42 U.S.C. 2232(a). Congress did not elaborate further on the meaning of "adequate protection," but it is reasonable to conclude that such a standard, as distinguished for example from "absolute" protection, left room for some degree of health impact on the public commensurate with the benefits of having a nuclear power program.[24] "Adequate" protection implies a realistic judgment. This choice of language by a Congress obviously aware of the realistic costs of technological and economic development does not suggest an intent to declare any loss of life whatsoever an unacceptable impact.[25]

The courts have uniformly confirmed that "[a]bsolute or perfect assurances are not required [by the Atomic Energy Act], and neither present technology nor public policy admit of such a standard." *Citizens for Safe Power* v. *NRC*, 524 F.2d 1291, 1297 (D.C. Cir. 1975). *Accord, Natural Resources Defense Council* v. *NRC*, 582 F.2d 166, 168 (2d Cir. 1978). Moreover, since the alternatives to a nuclear power plant, including the alternative of getting by with less electricity, carry health impacts which are also likely to include some deaths, a nuclear facility could not reasonably be deemed to provide inadequate protection solely on the ground that its estimated fatality impact was greater than zero. The Commission thus rejects the petition's argument that nuclear plants must be held *per se* unlawful under the Atomic Energy Act if their operation will cause deaths.

The above findings dispose of the petition's legally cognizable objections to nuclear power, but the Commission does not wish to conclude this response without some attention to the petition's argument that nuclear power is morally reprehensible and an "outrage" to the conscience. Petition at 150.

This Commission does not sit as an arbiter of any national morality alleged to exist apart from the Constitution and the laws of Congress, which each Commissioner is sworn to uphold. Nor does any other Commission. Nor does any Court. While the Commission brings its best judgment to the task of applying the phrases "adequate protection" or "no undue risk" to individual cases, we do not do so in a vacuum. A country that builds highways, that licenses airplanes, that regulates coal mines, has clearly not established "zero risk" or "zero deaths" as a legal or a moral absolute.

If the petitioners feel that the statutory standards applying to nuclear power are not stringent enough on moral grounds, they must make that case to the Congress. The morality embodied in the existing statutes is not the one that they urge, and we have no power to change that.

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[24] The Commission is now conducting a safety goal program aimed at articulating more clearly what the safety objectives in regulation of nuclear power should be. *See* 45 *Fed. Reg.* 71023 (October 27, 1980).

[25] With regard to work place hazards Congress has been explicit about its intent to tolerate harmful and possibly fatal occupational exposures to dangerous materials when complete protection is impractical. Section 6(b)(5) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 651 *et seq.*, directs the Secretary of Labor to set standards for exposure to certain toxic materials

which must adequately assures, *to the extent feasible* . . . that no employee will suffer material impairment of health or functional especity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life.

29 U.S.C. 655(b)(5) (emphasis supplied). In *Industrial Union Department, AFL–CIO* v. *American Petroleum Institute*, 48 U.S.L.W. 5022 (decided July 2, 1980), the Supreme Court reviewed and rejected an OSHA standard placing strict limits on occupational exposure to benzene, a known carcinogen with no safe level of exposure yet determined. The Court saw no constitutional or statutory barrier to retaining an earlier standard allowing higher exposures, even though there was evidence that OSHA's stricter but still feasible standard might prevent one or two deaths over a six-year period. 48 L.W. 5034.

That much having been said, however, we also note that we do not find nuclear power morally offensive. We agree that a decision to license nuclear plants has moral implications which deserve serious consideration, since the operation of these plants will cost human lives.[36]

With all respect to the sincerity of Ms. Honicker's convictions on the matter, however, the Commission does not believe that a moral case against nuclear power is made out simply by noting the potential linkage between radioactive effluents and fatal cancers. As we have discussed previously, the class of socially useful activities which include among their consequences unintended, undesired, but probably unavoidable deaths is broad and too closely integrated into modern social and economic structure to be labelled morally unacceptable by the government unless the Congress should choose to do so. Furthermore, a moral judgment on nuclear power must recognize that any of the alternatives, whether use of different technologies for generating electricity or social readjustments for achieving conservation on a major scale, if examined sufficiently closely can almost certainly be linked to at least a few deaths. Thus moral distinctions among the various choices for a policy on electricity generation cannot turn simply on whether a particular choice will cause deaths. They all will. If moral judgments are ultimately to be made about nuclear power, they will have to rest on complex criteria, quantitative where possible, rather than on appealingly simple but unusable principles like "even one death is too many."

Insistence on a simplistic approach to difficult technological issues may actually increase risks to society. For example:

> Each individual or group that makes recommendations, or otherwise takes actions affecting national priorities, bears some responsibility for any adverse effects. Thus an individual who effects the banning of DDT in a tropical country may inadvertently cause far more deaths than he defers, since the incidence of malaria will then increase. Similarly, if coal-burning electric generating plants are found to cause far more premature deaths than nuclear power plants (in agreement with most published estimates), an individual or agency that successfully advocates the construction of coal-burning plants instead of nuclear power plants may be responsible for unnecessary deaths. If the media should present an unbalanced perspective on some aspect of risk in society, and this causes risk-reduction priorities to be set inefficiently and even wrongly, the responsible media would, in effect, be contributing to the causing of premature deaths that might otherwise have been averted.
>
> David Okrent, "Comments on Societal Risk," *Science*, Vol. 208, pp. 373, 374 (April 25, 1980).

Nonetheless, costs in human lives stand apart from other costs. For the reasons we have discussed, some deaths from activities with the scope and value of nuclear power are "accceptable," at least in the sense that the Congress, the Executive, and the Judiciary know about them and accept them.

The benefit provided by nuclear power, generation of electricity, is clearly of great value to society. Although the program is not free of hazards, the risks to any individual are slight. The number of deaths estimated to result from the nuclear power program is extremely small compared to the number of persons benefitted, and it may be expected that all reasonable means to reduce the health impacts still further will be taken as they are discovered. Realistic alternatives to the nuclear power plants now under license would carry a cost in lives comparable to and in all probability greater than the impacts estimated for the nuclear plants. That is why the estimated fatalities from the nuclear power program do not mandate a shutdown of the industry for reasons either of law or of conscience.

For the reasons given in the foregoing analysis, the Commission has denied the Honicker petition.

It is so ordered.

Dated at Washington, D.C., this 28th day of July 1981.

Samuel J. Chilk,
Secretary of the Commission.

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[36] See notes 4 and 22 above.

APPENDIX E

CONSTITUTIONAL PROVISIONS

ARTICLE I. Section 8: The Congress shall have power to lay and collect taxes, duties, imposts and excises, to pay the debts and provide for the common defense and general welfare of the United States; ... To make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this Constitution in the Government of the United States, or in any department or officer thereof.

ARTICLE II, Section 3: ... [The President] shall take care that the laws be faithfully executed....

ARTICLE III, Section 2: The judicial power shall extend to all cases, in law and equity, arising under this Constitution, the laws of the United States, and treaties made, or which shall be made, under their authority;... (and) to controversies to which the United States shall be made a party....

ARTICLE IV, Section 2: The citizens of each State shall be entitled to all privileges and immunities of citizens in the several States....

Section 3: ... The Congress shall have the power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States....

ARTICLE VI, Section 2: This Constitution, and the laws of the United States which shall be made in pursuance thereof; and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land; and the Judges in every State shall be bound thereby....

AMENDMENT IV: The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no warrants shall issue but upon probable cause, supported by oath or affirmation, and particularly describing the place to be seached, and the persons or things to be seized.

AMENDMENT V: No person shall be held to answer for a capital or other infamous crime unless on a presentment or indictment of a grand jury... nor be deprived of life, liberty, or property, without due process of law....

AMENDMENT IX: The enumeration in the Constitution of certain rights shall not be construed to deny or disparage others retained by the people.

AMENDMENT X: The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States, respectively, or to the people.

AMENDMENT XIV: All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges and immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property, without due process of law; nor deny to any person with in its jurisdiction the equal protection of the laws.

APPENDIX F
TREATY PROVISIONS

THE NUREMBERG PRINCIPLES

U.N.General Assembly Res. 95 (I), GAOR Resolutions, 1946, International Law Commission Restatement, June-July, 1950.

Principle III: The fact that a person who committed an act which constitutes a crime under international law acted as Head of State or responsible government official does not relieve him from responsibility under international law.

Principle VI: The crimes hereinafter set out are punishable as crimes under international law:...

c. Crimes against humanity:

Murder, extermination, enslavement, deportation, and other inhuman acts done against any civilian population....

Principle VII: Complicity in the commission of a crime against peace, a war crime, or a crime against humanity as set forth in Principle VI is a crime under international law.

CONVENTION ON THE PREVENTION AND PUNISHMENT OF THE CRIME OF GENOCIDE

Official Records of the General Assembly, Third Session, 179th plenary meeting, December 9, 1948, Part I, at 174-178.

ARTICLE I

The Contracting Parties confirm that genocide, whether committed in time of peace or in time of war, is a crime under international law which they undertake to prevent and punish.

ARTICLE II

In the present Convention, genocide means any of the following acts committed with intent to destroy, in whole or in part, a national, ethical, racial or religious group, as such:

***(a)* Killing members of the group;**

***(b)* Causing serious bodily or mental harm to members of the group;**

***(c)* Deliberately inflicting on the group conditions of life calculated to bring about its physical destruction in whole or in part;**

***(d)* Imposing measures intended to prevent births within the group. . . .**

ARTICLE III

The following acts shall be punishable:

***(a)* Genocide;**

***(b)* Conspiracy to commit genocide;**

***(c)* Direct and public incitement to commit genocide;**

***(d)* Attempt to commit genocide;**

***(e)* Complicity in genocide.**

ARTICLE IV

Persons committing genocide or any of the other acts enumerated in article III shall be punished, whether they are constitutionally responsible rulers, public officials or private individuals.

ARTICLE IX

Disputes between the Contracting Parties relating to the interpretation, application or fulfilment of the present Convention, including those relating to the responsibility of a State for genocide or any of the other acts enumerated in article III, shall be submitted to the International Court of Justice at the request of any of the parties to the dispute.

UNITED NATIONS UNIVERSAL DECLARATION OF HUMAN RIGHTS

U.N. General Assembly Res. 217A (III), GAOR Resolutions (A/810), December 10, 1948, at 71-77

Article 3: Everyone has the right to life, liberty, and the security of person.

DECLARATION OF THE RIGHTS OF THE CHILD

Official Records of the General Assembly, Fourteenth Session, 841st plenary meeting, November 20, 1959, Supp. 10, at 19-20.

PRINCIPLE 1

The child shall enjoy all the rights set forth in this Declaration. Every child, without any exception whatsoever, shall be entitled to these rights...

PRINCIPLE 2

The child shall enjoy special protection, and shall be given opportunities and facilities, by law and by other means, to enable him to develop physically, mentally, morally, spiritually and socially in a healthy and normal manner and in conditions of freedom and dignity....

PRINCIPLE 4

... He shall be entitled to grow and develop in health; to this end, special care and protection shall be provided both to him and to his mother ....

PRINCIPLE 8

The child shall in all circumstances be the first to receive protection and relief.

PRINCIPLE 9

The child shall be protected against all forms of neglect, cruelty, and exploitation. He shall not be the subject of traffic, in any form.

UNITED NATIONS INTERNATIONAL COVENANT ON CIVIL AND POLITICAL RIGHTS

U.N.General Assembly, Res.2200 (XXI), 21 GAOR, Supp. No. 16 (A/6316), December 16, 1966, at 52-58.

Article 6: Every human being has the inherent right to life. This right shall be protected by law. No one shall be arbitrarily deprived of his life.

Article 7: No one shall be subjected to torture or to cruel, inhuman, or degrading treatment or punishment. In particular, no one shall be subjected without his free consent to medical or scientific experimentation.

UNITED NATIONS INTERNATIONAL COVENANT ON ECONOMIC, SOCIAL, AND CULTURAL RIGHTS

U.N.General Assembly, Res. 2200 (XXI), 21 GAOR, Supp No. 16 (A/6316) December 16, 1966, at 49-52.

Article 12: 1. The States Parties to the present covenant recognize the right of everyone to the enjoyment of the highest attainable standard of physical and mental health.

2. The steps to be taken by the States Parties to the present covenant to achieve the full realization of this right shall include those necessary for:

(a) The provision for the reduction of the stillbirth rate and of infant mortality and for the healthy development of the child.

(b) The improvement of all aspects of environmental and industrial hygiene.

(c) The prevention, treatment, and control of epidemic, endemic, occupational, and other diseases.

CONVENTION ON THE NON-APPLICABILITY OF STATUTORY LIMITATIONS TO WAR CRIMES AND CRIMES AGAINST HUMANITY

Official Records of the General Assembly, 23rd Session, 1727th plenary meeting, November 26, 1968, Supp. 18, at 40-41.

ARTICLE I

No statutory limitation shall apply to the following crimes, irrespective of the date of their commission:

* * *

***(b)* Crimes against humanity whether committed in time of war or in time of peace as they are defined in the Charter of the International Military Tribunal, Nurnberg, of 8 August 1945 and confirmed by resolutions 3(I) of 13 February 1946 and 95(I) of 11 December 1946 of the General Assembly of the United Nations. . . and the crime of genocide as defined in the 1948 Convention on the Prevention and Punishment of the Crime of Genocide, even if such acts do not constitute a violation of the domestic law of the country in which they were committed.**

ARTICLE II

If any of the crimes mentioned in article I is committed, the provisions of this Convention shall apply to representatives of the State authority and private individuals who, as principals or accomplices, participate in or who directly incite others to the commission of any of those crimes, or who conspire to commit them, irrespective of the degree of completion, and to representatives of the State authority who tolerate their commission.

ARTICLE IV

The States Parties to the present Convention undertake to adopt, in accordance with their respective constitutional processes, any legislative or other measures necessary to ensure that statutory or other limitations shall not apply to the prosecution and punishment of the crimes referred to in articles I and II of this Convention and that, where they exist, such limitations shall be abolished.

THE HELSINKI AGREEMENT

Signed August 1, 1975, Helsinki Finland, by 35 Nations.

Article VII: ... The participating States will act in conformity with the purposes and principles of the Universal Declaration of Human Rights. They will also fulfill their obligations as set forth in the international declarations and agreements in this field....

APPENDIX G

STATUTORY PROVISIONS

Administrative Procedure Act

5 U.S.C.§ 702:

A person suffering legal wrong because of agency action, or adversely affected or aggrieved by agency action within the meaning of a relevant statute, is entitled to judicial review thereof.

Atomic Energy Act of 1954

42 U.S.C.§2011:

Atomic energy is capable of application for peaceful as well as military purposes. It is therefore declared to be the policy of the United States that—

(a) the development, use, and control of atomic energy shall be directed so as to make the maximum contribution to the general welfare, subject at all times to the paramount objective of making the maximum contribution to the common defense and security; and
(b) the development, use, and control of atomic energy shall be directed so as to promote world peace, improve the general welfare, increase the standard of living, and strengthen competition in free enterprise.

42 U.S.C.§2012:
(d) The processing and utilization of source, byproduct, and special nuclear material must be regulated in the national interest and in order to provide for the common defense and security and to protect the health and safety of the public.
(e) Source and special nuclear material, production facilities, and utilization facilities are affected with the public interest, and regulation by the United States of the production and utilization of atomic energy and of the facilities used in connection therewith is necessary in the national interest to assure the common defense and security and to protect the health and safety of the public
(g) Funds of the United States may be provided for the development and use of atomic energy under conditions which will provide for the common defense and security and promote the general welfare.

42 U.S.C.§2013:
It is the purpose of this chapter to effectuate the policies set forth above by providing for—
(c) a program for Governmental control of the possession use, and production of atomic energy and special nuclear material, whether owned by the Government or others, so directed as to make the maximum contribution to the common defense and security and the national welfare...;
(d) a program to encourage widespread participation in the development and utilization of atomic energy for peaceful purposes to the maximum extent consistent with the common defense and security and with the health and safety of the public.

42 U.S.C.§2051:
(a) The Commission is directed to exercise its powers in such manner as to insure the continued conduct of ... development ... by private or public institutions or persons ... relating to—

(4) utilization of special nuclear material, atomic energy,

and radioactive material and processes entailed in the utilization or production of atomic energy or such material for all other purposes, including industrial and commercial uses, the generation of usable energy, and the demonstration of advances in the commercial or industrial application of atomic energy;
(5) the protection of health and the promotion of safety during research and production activities; and
(6) the preservation and enhancement of a viable environment by developing more efficient methods to meet the Nation energy needs.

(d) The arrangements made pursuant to this section shall contain such provisions (1) to protect health, (2) to minimize danger to life or property ... as the Commission may determine.

42 U.S.C.§2201 (i):
In the performance of its functions the Commission is authorized to—
(i) prescribe such regulations or orders as it may deem necessary ...
(3) to govern any activity authorized pursuant to this chapter, including standards and restrictions governing the design, location, and operation of facilities used in the conduct of such activity, in order to protect the health and to minimize danger to life or property.

42 U.S.C.§2232:
(a) In connection with applications for licenses to operate production or utilization facilities, the applicant shall specifically state such information as the Commission, by rule or regulation, may determine to be necessary to decide such of the technical and financial qualifications of the applicant, the character of the applicant, the citizenship of the applicant, or any other qualifications of the applicant as the Commission may deem appropriate for the license. In connection with applications for licenses to operate production or utilization facilities, the applicant shall state such technical specifications, including information of the amount, kind, and source of special nuclear material required, the place of use, the specific characteristics of the facility, and such other information as the Commission may, by rule or regulation, deem necessary in order to enable it to find that the utilization or production of special nuclear material will be in accord with the common defense and security and will provide adequate protection of the health and safety of the public.

APPENDIX H

Notes to Text References

[1] *Honicker v. United States, et al.* (D.C. Cir. No. 81-2006), Appellant's Brief (App.Br.) at 26, 38-40: Joint Committee on Atomic Energy (JCAE), *Atomic Power and Private Enterprise*, 82nd Cong., 2d Sess., December, 1952, at 30-31, 42-43, and 53; and JCAE, *Summary of a Hearing Before the Joint Committee: Atomic Power Development and Private Enterprise*, 83rd Cong., 1st Sess., December, 1953, at 17; but see: Favish, A., Radiation Injury and the Atomic Veteran: Shifting the Burden of Proof on Factual Causation, 32 *Hastings L.R.* 933 (March, 1981). The historical record indicates that prominent radiologists, health physicists, and geneticists of the time recognized even at the outset of America's atomic power program that any large population exposure to even very minute amounts of ionizing radiation could create lingering public health problems and genetic damage, and these scientists went to some lengths, including sacrificing their own illustrious careers, to express their views publicly. See, e.g.: Wasserman, H., and N. Solomon, *et al., Killing Our Own: The Disaster of America's Experience with Atomic Radiation* (Dell Publishing; New York, 1982); Rosenburg, H.L., *Atomic Soldiers, American Victims of Nuclear Experiments*, (Beacon Press; Boston, 1980), Ch.7; pp. 135-154; *Shutdown: Nuclear Power on Trial*, Bates, A., ed. (Book Publishing Co.; Summertown, 1979), pp. 160-168; Nader, R., and J. Abbotts, *The Menace of Atomic Energy* (W.W.Norton; New York, 1977); Grossman, K., *Cover-Up: What You Are Not Supposed To Know About Nuclear Power* (Permanent Press: New York, 1980), Ch.4, pp.73-112; House Subcommittee on Health and the Environment of the Committee on Interstate and Foreign Commerce, *Hearings on the Effect of Radiation on Human Health*, Ser.No. 95-179, 95th Cong. 2d Sess. (1978), Vol. 1, pp. 672-677; House Subcommittee on Oversight and Investigations of the Committee on Interstate and Foreign Commerce, *The Forgotten Guinea Pigs. A Report on the Health Effects of Low-Level Radiation Sustained as a Direct Result of the Nuclear Weapons Testing Program Conducted by the United States Government*, Comm.Pr. 96-IFC53, 96th Cong., 2d Sess. (1980); and House Subcommittee on Energy Conservation and Power of the Committee on Energy and Commerce, *Hearing on Economic Growth Through Energy Efficiency*, Ser.No. 97-53, 97th Cong., 1st Sess. (1981).

[2] App.Br. at 38; *Atomic Power and Private Enterprise, ibid.*

[3] App.Br., Attachment: *Atomic Energy Act of 1954*, Senate Report No. 1699, 83rd Cong., 2d Sess., *U.S. Code Cong. and Admin. News (1954)*, at 3458.

[4] In 1967, Congress passed authorizing legislation to permit expanded environmental safety research in Atomic Energy Commission laboratories. See: Public Law 90-190, *To Amend the Atomic Energy Act*, Sec. 7, 81 Stat. 575, 577 (1967); and Senate Report No. 743, 90th Cong., 1st Sess., *U.S. Code Cong. and Admin. News (1967)*, at 2153.

[5] AEC San Francisco Operations Office, "Biomedical Studies Planned for AEC's Livermore Laboratory," press statement.

[6] See: JCAE, *Environmental Effects of Producing Electric Power*, Hearings pp. 640-706, 91st Cong., 1st. Sess., Part I, (Oct.-Nov., 1969); Senate Subcommittee on Air and Water Pollution of the Committee on Public Works, *Underground Uses of Nuclear Energy*, Hearings on S.3042, pp. 319-444, 91st Cong., 1st Sess., Part I (Nov. 18-20, 1969) and pp. 1382-1625, 91st Cong. 2nd Sess., Part II (Aug. 5, 1970). See also: Gofman, J.W. and A.Tamplin, *Poisoned Power* (Rodale Press; Emmaus, 1971) at 96.

Operation of NRC licensed facilities is governed by dose-design objectives appended to the Code of Federal Regulations. These design-objective values are chosen to permit flexibility of operation while keeping the radiation exposure to the public from normal operation as low as readily achievable. 10 CFR 20 sets a limit for exposures to members of the public from any licensed facility of 500 mrem/yr total body dose. 40 CFR 190, the Environmental Protection Agency's standard, sets a limit of 25 mrem/yr total body dose to an individual member of the public from all fuel cycle operations (radon exposures excepted). The range of whole body exposure within these permissible guidelines is therefore from one fifth to four times natural background levels. See note 11.

[7] Honicker, *Petition for Emergency and Remedial Action Before the Nuclear Regulatory Commission* (Petition), pp. 5-43, 68-80 (1978); and see, Gofman, J.W., *Radiation and Human Health* (Sierra Club Books; San Francisco, 1981); National Academy of Sciences, *Risks Associated with Nuclear Power: A Critical Review of the Literature*, (Academy Press; Washington, 1979); National Academy of Sciences, *Energy in Transition 1980-2010*, (W.H. Freeman and Co., San Francisco: 1980), at 623-627, 640; and Comey, D., The Legacy of Uranium Tailings, *Bull. Atomic Scientists* 31:7;43-45 (Sept.,1975).

[8] Petition; *ibid.*, at 8-9; Mancuso, T.F., *et al.*, Radiation exposures of Hanford workers dying from cancer and other causes, *Health Physics* 33:369 (1977); Kneale, G.W., *et al.* Re-analysis of data relating to the Hanford study of the cancer risks of radiation workers, *Late Biological Effects of Ionizing Radiation*, Vol.I (International Atomic Energy Agency; Vienna, 1978); Kneale, *et al.* Hanford Radiation Study III: a cohort study of the cancer risks from radiation to workers at Hanford, *Br.J.Ind.Med.* 38:156 (1981): Advisory Committee on the Biological Effects of Ionizing Radiation (BEIR III), *The Effects on Populations of Exposure to Low-Levels of Ionizing Radiation: 1980* (Academy Press; Washington, 1981); and Stewart, A.M., Delayed effects of A-bomb radiation: a review of recent mortality rates and risk estimates for five-year survivors, *Br.J.Epid. and Com.Health*, 36:80 (1982).

[9] Petition at 17; and see, Bross, I.D.J., and N. Natarajan, Cumulative genetic damage in children exposed to preconception and intrauterine radiation, *Investig. Radiology* 15:52 (1980).

[10] Petition at 150; and see, Bertell, R., Radiation Exposure and Human Species Survival, *Envir. Health Rev.* (Canadian Inst. of Public Health Inspectors, June 1981), 43-52 (App. Br. at 12).

[11] Petition at 10-12; and see, Archer V.E., Effects of Low Level Radiation: A Critical Review, *Nuclear Safety* 21:1;68, 75 (1979) (App.Br. at 6); and Cohen, J.J., An evaluation of the effect of natural background radiation on cancer incidence, *Health Physics* 35:916 (Dec., 1978). The Department of Energy has estimated that up to 170,000 cancers per year in America are attributable to natural radiation; *Final Generic Environmental Impact Statement: Management of Commercially Generated Radioactive Waste* (DOE/EIS-0046F, 1980), Vol 1, p. 3.30. This would represent approximately 50 percent of the current national cancer rate. If radiation exposures to the general population were to be increased by 20 percent over background, 34,000 new cancers per year could be expected. A four-fold increase could cause 680,000 new cancers in the U.S. annually. Of course, all populations are exposed to a multitude of other physical and chemical properties of the environment and will experience the totality of the effect which these processes will cause. We will know death and illness from our environmental releases of PCBs, dioxin, lead, and asbestos; just as we will increase our birth defects and cancers from any release of radioactive materials.

[12] Petition at 20; Bertell, R., X-ray exposure and premature aging, *J.Surg. Oncology*, 9:4 (1977).

[13] Petition at 3.

[14] Petition at 16-35; and notes 1, 6, 7, and 8, *supra*. But our newfound knowledge of microbiology, epidemiology and health physics also allowed the National Cancer Institute to discover that the national mammography program—which planned to administer an annual breast screening to all women—would have caused twelve breast cancers for each cancer it detected, in time for NCI to abruptly order the x-ray program terminated. See Wasserman, *et al.*, *supra* n.1 at 133; and I.D.J. Bross, "Written Statement Submitted for the NIH/NCI Consensus Development Meeting on Breast Cancer Screening," (1977).

[15] An imminent hazard may be declared at any point in a chain of events that may ultimately lead to public harm. See: Gelpe and Tarlock, The Uses of Scientific Information in Environmental Decisionmaking, 48 *S.Cal. L.R.* 371, 419 (1974), and *Ethyl Corp., et al., v. Envir. Protection Agency*, 541 F.2d 1, 13-19 (1976).

[16] Petition at 77-84, 126-127; Wasserman, *et al.*, *supra* n.1.; Gofman, *supra* n.6; and Sternglass, E.J., *Secret Fallout* (McGraw-Hill; New York, 1981). In the order below, the NRC has left little doubt that: ". . .the Commission's own estimates of nuclear power health effects include a number of radiologically induced cancer deaths among present and future populations." (46 *Fed. Reg.* 39579, col 1.)

[17] App. Br. at 20. The NRC has previously referred to these numbers as "the Commission's health effects estimates" for purposes of litigation on the question presented. While the Commission hastens to characterize all these injuries as "potential" rather than "actual," the distinction is of no practical or legal significance. Since there is scientific controversy in prediction of human health effects from the low levels of ionizing radiation usually associated with routine releases under federal license, some number of the predicted cancers or birth defects may never occur. If a natural or man-made catastrophe were to suddenly extinguish the human species, none would occur. But, by all reasonable estimates of present science, some fatal health effects not only *will occur*, but are *now occurring* from population exposures of the magnitude which the NRC allows.

[18] The final order below, which appears as Appendix D.

[19] 46 *Fed. Reg.* 39580, col 3.

[20] Petition at 135; Energy Information Administration, *Electric Power Monthly*, August, 1981 (Dept. of Energy, DOE/EIA-0226[81/08]), Table 60, p.91; and note Ahearne, J.F., Remarks before the American Nuclear Society, *NRC Speech No. S-9-82*, May 14, 1982.

[21] The FY 1982 budget allocates more than $1 billion to direct Department of Energy subsidies of nuclear energy, and over $2 billion for government-owned nuclear research laboratories. See too the indirect subsidies: Petition at 135; App.Br. at 25; House Committee on Government Operations, *Nuclear Power Costs*, H.Rep. 95-1090, 95th Cong. 2d. Sess. (1978); and Bowring, J., Testimony to the House Subcommittee on Oversight and Investigations of the Committee on Interior and Insular Affairs, October 23, 1981.

[22] Petition at 135, App.Br. at 64; and see, *Hearing on Economic Growth Through Energy Self-Sufficiency, supra* n.1; House Committee on Energy and Environment, *Report on Building a Sustainable Future*, Comm.Print 97K, 97th Cong., 1st Sess. (1981); Center for Renewable Resources, *et al.*, *The Reagan Energy Plan: A Major Power Failure* (Nat. Audobon Society, Washington, 1982); Lovins and Lovins, *Energy/War: Breaking the Nuclear Link* (Friends of the Earth; San Francisco, 1981); Joint Economic Committee of the Congress, *Energy Conservation: Emerging Consensus, Diverging Commitment*, 97th Cong. 2d Ses. (1980); Sant, R., *Eight Great Energy Myths*, (Energy Productivity Center; Arlington, 1981); Taylor, V., *The Easy Path Energy Plan* (Union of Concerned Scientists; Cambridge, 1979); Department of Energy, *Low Energy Futures for the United States* (DOE/FE-0020, 1980); Council on Environmental Quality, *The Good News About Energy* (1979); Stobaugh and Yergin, *Energy Futures: A Report of the Harvard Business School Project on Energy* (Random House; New York, 1979); and Carlson, Freedman and Scott, A Strategy for a Non-Nuclear Future, *Environment* 20:6;6 (1979). [Appellant's Reply Brief, pp. 25-29, n.3, and Comments, *infra*, note 42.]

[23] The Commission has confined its search for less damaging alternatives to only other alternatives for generating electricity. This eliminates the least intrusive, most voluntary, least expensive, and safest alternatives entirely; namely, alternatives *to electricity* for supplying our needs. If what we want is not volts or amps but aid and comfort, we need to look at the possibilities for federal activity of a comparable scale to the nuclear energy effort which would supply these needs at a comparable or better price, with less

involuntary impact. Clearly, improvements in energy end-use efficiency and solar-renewables have the overwhelming advantage today. These alternatives have actually accounted for 50 times more new energy than nuclear power has provided in the three years since the Honicker petition was filed, despite a tenfold greater expenditure during that period to give nuclear power a competitive margin.

[24] *Honicker v. U.S.* (D.C. Cir., No.81-2006), NRC Opposition to Motion for Extraordinary Writ, at 19.

[25] 46 *Fed. Reg.* 39579, n. 22.

[26] *Honicker v. U.S.* (D.C. Cir., No.81-2006), Respondents' Brief at 32, n.18.

[27] 46 *Fed. Reg.* 39580, col 3.

[28] Schell, J., *The Fate of the Earth* (Alfred A. Knopf; New York, 1982), p. 116.

[29] *Honicker v. U.S.* (D.C. Cir., No.81-2006), Appellant's Reply Brief at 7.

[30] However, the public record indicates that the problem was known to at least a few. Declassified health physics reports from the Manhattan Project (App. Br. at 9) indicate that the senior scientists believed at least as early as 1945 that:

> ". . . the genetic effect has no threshold and exposure is not only cumulative in the individual, but in succeeding generations. On this basis, there would be no tolerance dose, but rather an acceptable injury-limit."[Parker, H.M., Instrumentation and Radiation Protection (March, 1947), *Health Physics*, 38:957,970, June 1980]
>
> and:
> "Even sub-tolerance radiations produce certain biological changes (cosmic rays are supposed to have some biological effects), so tolerance radiation is not what one strives to get but the maximum permissible dose."[Morgan, K.Z., The Responsibilities of Health Physics, *The Scientific Monthly*, 93 (August 1946); reprinted in *Health Physics* 38:949-952, June 1980.]

[31] *Generic Environmental Statement on the Use of Recycled Plutonium in Mixed Oxide Fuels in Light Water Cooled Reactors*, NUREG-0002, 1976.

[32] Petition at 134; GESMO *ibid*, Table ES-3, p.ES-14.

[33] The question of what percentage of the population can be acceptably damaged came first to the attention of the AEC at a meeting of the Advisory Committee on Biology and Medicine on January 16-19, 1957. At this meeting the AEC advisors determined that a 20-percent increase in the rate of bone cancers and birth defects nation-wide would be an "acceptable" effect of U.S. nuclear weapons testing activities. These scientists also acknowledged at this time that the long-term genetic effects were totally unknown.

[34] See: 42 U.S.C.§§ 2011, 2012, 2013, 2015, and 2201 (Appendix G); and *Senate Report 1699, supra* n.3. Where the 1946 Act used the phrase, "as far as practicable" in Section 1's declaration of purpose to promote the public health and welfare, the 1954 version deleted the phrase in favor of a simple, mandatory order. In only one section of the Act is "protection" modified by the word "adequate," implying a balancing of interests: in Section 182a (42 U.S.C.§ 2232a), "License Applications—Contents and Form." Upon this use of the word "adequate" alone, the Commission hinges its entire argument for Congressional authorization. Yet, the *Senate Report* makes clear that the word "adequate" in Section 182a is meant only to modify license *information*, not the public's protection. See *Senate Report 1699, supra* n.3, at 3458. The unambiguous expectation of the 83rd Congress was zero radiation deaths in the general population from the normal, daily operation of federally licensed reactors.

[35] The legal basis claimed by Congress in enacting the 1954 Act is Article 1, Section 8, and Article IV, Section 3. While it cannot be denied that the Constitution gives Congress the power to regulate interstate and foreign commerce in order to provide for the common welfare, and that Congress may make all needful rules are regulations respecting United States property (which includes all fissionable nuclear material), there is nothing in the Constitution that indicates Congress may sacrifice innocent lives in order to further these ends.

[36] Edmund Burke, *Works*, Rivington Edition (16 Vols., London 1803-27) V, 78.

[37] *Calder v. Bull*, 3 U.S. (3 Dall) 386, 1 L.Ed.648; Petition at 141.

[38] U.N. Gen.Ass.Res. 217A (III), GAOR Res. (A/810), Dec.10, 1948, at 71-77 (see Appendix F); Petition at 138.

[39] The Helsinki Agreement was signed by the U.S. on August 1, 1975. It requires all 35 signatories to observe the human rights standards promulgated by the United Nations.

[40] *The Fate of the Earth, supra* n.27, at 145.

[41] Under the Genocide Convention, "genocide" is defined as any act "committed with the intent to destroy, in whole or in part, a . . . group as such"—including deliberately inflicting upon the group conditions of life calculated to bring about its physical destruction n whole or part. The Convention leaves enforcement against government bodies to national courts of the respective sovereign states. See Appendix F.

[42] *In re Honicker Petition* (U.S. Nuclear Regulatory Commission rulemaking), *Comments of the Petitioner's Staff on the NRC Staff Response to her Petition: An Older View Concerning Inalienable Rights*, SECY-78-560 (1979), at 14.

[43] *Ibid.*, and see note 22, *supra*.

[44] 46 *Fed. Reg.* 39580, see Appendix D.

[45] 46 *Fed. Reg.* 15175, col. 1.

[46] 46 *Fed. Reg.* 39580, col 2.

[47] 46 *Fed. Reg.* 39580, col 3.

[48] Blackstone, *Commentaries on the Laws of England*, Vol. I (1765); App. Br. at 48.